

METHODS FOR IDENTIFYING NON-VOLATILE MEMORY ELEMENTS WITH POOR SUBTHRESHOLD SLOPE OR WEAK TRANSCONDUCTANCE

ABSTRACT OF THE DISCLOSURE

The present invention presents a number of methods for identifying cells with poor subthreshold slope and reduced transconductance. A first set of techniques focuses on the poor subthreshold behavior of degraded storage elements by cycling cells and then programming them to a state above the ground state and the reading them with a control gate voltage below the threshold voltage of this state to see if they still conduct. A second set of embodiments focuses on weak transconductance behavior by reading programmed cells with a control gate voltage well above the threshold voltage. A third set of embodiments alters the voltage levels at the source-drain regions of the storage elements. The current-voltage curve of a good storage element is relatively stable under this shift in bias conditions, while degraded elements exhibit a larger shift. The amount of shift can be used to differentiate the good elements from the bad.